

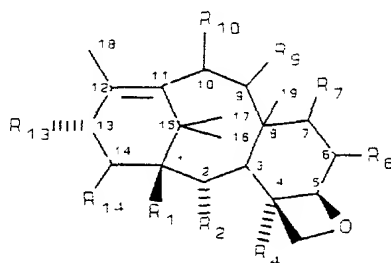
WHAT IS CLAIMED IS:

1. A compound comprising a taxane containing at least 2 electron-affinic radiosensitizing functional groups.

2. The compound of claim 1 wherein at least one of the radiosensitizing groups is a nitro-substituted carbocyclic or heterocyclic aromatic moiety which is attached to the C2, C4, C7, C9, C10 or C14 position of the taxane.

3. The compound of claim 1 wherein said radiosensitizing groups are independently selected from nitro-substituted carbocyclic and heterocyclic aromatic moieties and wherein at least one of said radiosensitizing groups is attached to the C2, C4, C7, C9, C10 or C14 position of the taxane.

4. A compound corresponding to the structure:



wherein

M comprises ammonium or is a metal;

R₁ is hydrogen or hydroxy;

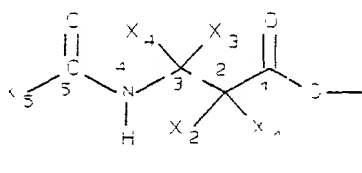
R₂ is -OT₂, -OCOZ₂, -OCOOZ₂, RSG₁ or RSG₂;

R₄ is -OT₄, -OCOZ₄, -OCOOZ₄, RSG₁ or RSG₂;

R₇ is hydrogen, halogen, -OT₇, -OCOZ₇, -OCOOZ₇, RSG₁ or RSG₂;

R_{10} is hydrogen, keto, $-OT_{10}$, $-OC(O)Z_{10}$, $-OC(O)OZ_{10}$, RSG_1 or RSG_2 ;

R₁₃ is hydroxy, protected hydroxy, keto, MO- or



20 T_2 , T_4 , T_7 , T_9 and T_{10} are independently hydrogen
or hydroxy protecting group;

X₂ is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

X₄ is hydrogen, alkyl, heterosubstituted alkyl, alkenyl, heterosubstituted alkenyl, alkynyl, heterosubstituted alkynyl, phenyl, heteroaryl, or heterosubstituted heteroaryl;

X₆ is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, heterosubstituted heteroaryl, hydroxy protecting group or a functional group which increases the water solubility of the taxane derivative;

X₈ is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, RSG₁ or RSG₂;

40 X_{10} is alkyl, heterosubstituted alkyl, alkenyl, heterosubstituted alkenyl, alkynyl, heterosubstituted alkynyl, phenyl, heteroaryl, or heterosubstituted heteroaryl;

X_{11} is hydrocarbon, heterosubstituted
45 hydrocarbon, heteroaryl, heterosubstituted heteroaryl, RSG_1 or RSG_2 ;

Z_2 , Z_4 , Z_7 , Z_9 and Z_{10} are independently hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

50 RSG_1 is an electron-affinic moiety;

RSG_2 is $-L-(RSG_1)_n$;

L is a linker comprising a chain of 1 to 30 atoms in the chain, the atoms being selected from the group consisting of C, O, N, S, Si, and P; and

55 n is an integer greater than or equal to 1; provided that the compound contains at least one radiosensitizing group attached to the C2, C4, C7, C9, C10, C14, C3' or C5' position of the compound.

5. The compound of claim 4 wherein RSG_1 is an electron-affinic group selected from the group consisting of (i) carbocyclic and heterocyclic aromatic moieties which possess one or more carbonyl, trifluoromethyl, halogen, nitro, sulfonyl, sulfinyl, phosphoryl, oxide or cyano groups, (ii) heterocyclic aromatic moieties containing two or more heteroatoms, (iii) metal complexes, and (iv) organo-metallic groups in which the metal is covalently bonded to carbon.

6. The compound of claim 4 wherein RSG_1 is selected from the group consisting of imidazoles, triazoles, pyridines, benzamides, nicotinamides, benzotriazine oxides, furans, thiophenes, oxazoles and thiozoles possessing one or more carbonyl,

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trifluoromethyl, halogen, nitro, sulfonyl, sulfinyl, phosphoryl, oxide or cyano groups.

7. The compound of claim 4 wherein

R_1 is hydrogen or hydroxy;

R_2 is $-\text{OCOZ}_2$, RSG_1 , or RSG_2 ;

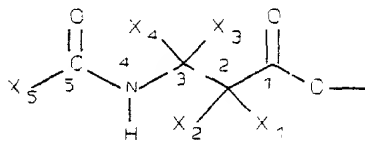
R_4 is $-\text{OCOZ}_4$, RSG_1 or RSG_2 ;

5 R_7 is hydrogen, halogen, $-\text{OT}_7$, $-\text{OCOZ}_7$, RSG_1 or RSG_2 ;

R_9 is hydrogen, keto, $-\text{OT}_9$, $-\text{OCOZ}_9$, RSG_1 or RSG_2 ;

R_{10} is hydrogen, keto, $-\text{OT}_{10}$, $-\text{OCOZ}_{10}$, RSG_1 or RSG_2 ;

10 R_{13} is



R_{14} is hydrogen, hydroxy or protected hydroxy;

T_2 , T_4 , T_7 , T_9 and T_{10} are independently hydrogen or hydroxy protecting group;

15 X_1 is $-\text{OX}_6$;

X_2 is hydrogen;

X_3 is alkyl, alkenyl, phenyl, heteroaryl, or heterosubstituted heteroaryl;

20 X_4 is hydrogen, hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

X_5 is $-\text{X}_{10}$, $-\text{OX}_{10}$, $-\text{SX}_{11}$, or $-\text{NX}_9\text{X}_{11}$;

X_6 is hydrogen or hydroxy protecting group;

X_8 is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, RSG_1 or RSG_2 ;

25 X_{10} is alkyl, alkenyl, phenyl, heteroaryl, or heterosubstituted heteroaryl;

Z_2 , Z_4 , Z_7 , Z_9 and Z_{10} are independently hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

30 RSG_1 is an electron-affinic moiety;

RSG_2 is $-L-(RSG_1)_n$;

L is a linker comprising a chain of 1 to 10 atoms in the chain, the atoms being selected from the group consisting of C, O, N, S, Si, and P; and

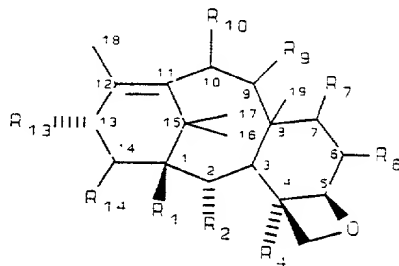
35 n is 1 or 2.

8. The compound of claim 4 wherein RSG_1 is a heterocyclic aromatic moiety containing two or more heteroatoms.

9. The compound of claim 4 wherein RSG_1 is a metal complex.

10. The compound of claim 4 wherein RSG_1 is selected from the group consisting imidazoles, triazoles, pyridines, benzamides, furans, thiophenes, oxazoles and thiozoles possessing one or more nitro groups.

11. A compound corresponding to the structure:



wherein

M comprises ammonium or is a metal;

5 R_1 is hydrogen or hydroxy;

R_2 is RSG_1 or RSG_2 ;

R_4 is $-OT_4$, $-OCOOZ_4$, $-OCOOZ_4$, RSG_1 or RSG_2 ;

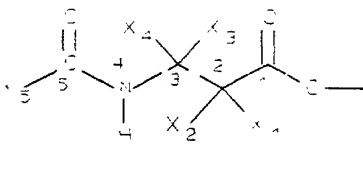
R₇ is hydrogen, halogen, -OT₇, -OC(O)Z₇, -OC(O)OZ₇,

10 R_9 is hydrogen, keto, $-OT_9$, $-OCOZ_9$, $-OCOOZ_9$, RSG ,

R₁₀ is hydrogen, keto, -OT₁₀, -OCOOZ₁₀, -OCOOZ₁₀,

R_7 , R_9 , and R_{10} independently have the alpha or

R₁₃ is hydroxy, protected hydroxy, keto, MO- or



R₁₄ is hydrogen, hydroxy, protected hydroxy,

20 T_2, T_4, T_7, T_9 and T_{10} are independently hydrogen

X_1 is $-OX_6$;

X₂ is hydrogen, hydrocarbon, heterosubstituted

25 X_3 and X_4 are independently hydrogen,

X_5 is $-X_{10}$, $-OX_{10}$, $-SX_{10}$, or $-NX_8X_{10}$;

X₆ is hydrogen, hydrocarbon, heterosubstituted

X₈ is hydrogen, hydrocarbon, heterosubstituted

35 X₁₀ is hydrocarbon, heterosubstituted

hydrocarbon, heteroaryl, heterosubstituted heteroaryl,

Z_4 , Z_7 , Z_9 and Z_{10} are independently hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or

40 heterosubstituted heteroaryl;

RSG_1 is an electron-affinic moiety;

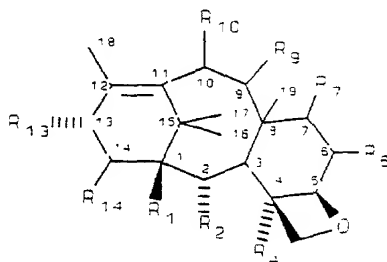
RSG_2 is $-L-(RSG_1)_n$;

L is a linker comprising a chain of 1 to 30 atoms in the chain, the atoms being selected from the group consisting of C, O, N, S, Si, and P; and

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n is an integer greater than or equal to 1.

12. A compound corresponding to the structure:



wherein

M comprises ammonium or is a metal;

5 R_1 is hydrogen or hydroxy;

R_2 is $-OT_2$, $-OCOZ_2$, $-OCOOZ_2$, RSG_1 or RSG_2 ;

R_4 is RSG_1 or RSG_2 ;

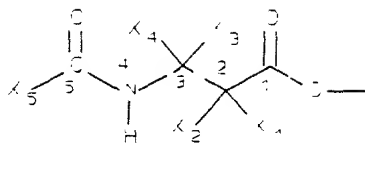
R_7 is hydrogen, halogen, $-OT_7$, $-OCOZ_7$, $-OCOOZ_7$, RSG_1 or RSG_2 ;

10 R_9 is hydrogen, keto, $-OT_9$, $-OCOZ_9$, $-OCOOZ_9$, RSG_1 or RSG_2 ;

R_{10} is hydrogen, keto, $-OT_{10}$, $-OCOZ_{10}$, $-OCOOZ_{10}$, RSG_1 or RSG_2 ;

15 R_7 , R_9 , and R_{10} independently have the alpha or beta stereochemical configuration;

R_{13} is hydroxy, protected hydroxy, keto, MO- or



R_{14} is hydrogen, hydroxy, protected hydroxy, RSG₁ or RSG₂;

20 T_2 , T_4 , T_7 , T_9 and T_{10} are independently hydrogen or hydroxy protecting group;

X_1 is $-OX_6$;

X_2 is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

25 X_3 and X_4 are independently hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, heterosubstituted heteroaryl, or RSG₁;

X_5 is $-X_{10}$, $-OX_{10}$, $-SX_{10}$, or $-NX_8X_{10}$;

30 X_6 is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, heterosubstituted heteroaryl, hydroxy protecting group or a functional group which increases the water solubility of the taxane derivative;

X_8 is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, RSG₁ or RSG₂;

35 X_{10} is hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, heterosubstituted heteroaryl, RSG₁ or RSG₂;

40 Z_2 , Z_7 , Z_9 and Z_{10} are independently hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

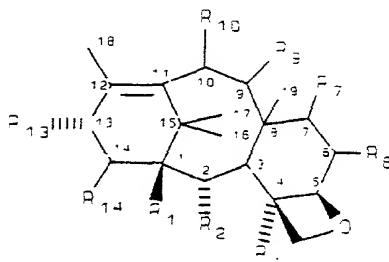
RSG₁ is an electron-affinic moiety;

RSG₂ is $-L-(RSG_1)_n$;

L is a linker comprising a chain of 1 to 30 atoms in the chain, the atoms being selected from the group consisting of C, O, N, S, Si, and P; and

n is an integer greater than or equal to 1.

13. A compound corresponding to the structure:



wherein

M comprises ammonium or is a metal;

R₁ is hydrogen or hydroxy;

R₂ is -OT₂, -OCOZ₂, -OCOOZ₂, RSG₁ or RSG₂;

R₄ is -OT₄, -OCOZ₄, -OCOOZ₄, RSG₁ or RSG₂;

R₇ is RSG₁ or RSG₂;

R₉ is hydrogen, keto, -OT₉, -OCOZ₉, -OCOOZ₉, RSG₁

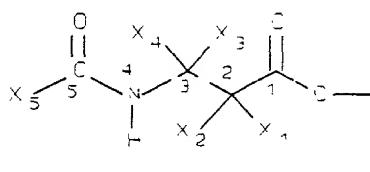
or RSG₂;

R₁₀ is hydrogen, keto, -OT₁₀, -OCOZ₁₀, -OCOOZ₁₀,

RSG₁ or RSG₂;

R₇, R₉, and R₁₀ independently have the alpha or beta stereochemical configuration;

R₁₃ is hydroxy, protected hydroxy, keto, MO- or



R₁₄ is hydrogen, hydroxy, protected hydroxy, RSG₁ or RSG₂;

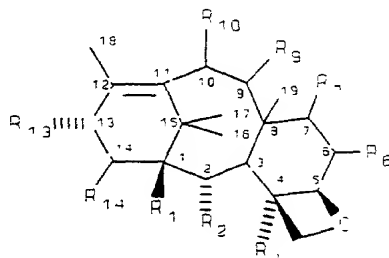
T₂, T₄, T₉, and T₁₀ are independently hydrogen or hydroxy protecting group;

X₁ is -OX₆;

X₂ is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

- X_3 and X_4 are independently hydrogen,
 25 hydrocarbon, heterosubstituted hydrocarbon, heteroaryl,
 heterosubstituted heteroaryl or RSG_1 ;
 X_5 is $-X_{10}$, $-OX_{10}$, $-SX_{10}$, or $-NX_9X_{10}$;
 X_6 is hydrogen, hydrocarbon, heterosubstituted
 hydrocarbon, heteroaryl, heterosubstituted heteroaryl,
 30 hydroxy protecting group or a functional group which
 increases the water solubility of the taxane derivative;
 X_8 is hydrogen, hydrocarbon, heterosubstituted
 hydrocarbon, RSG_1 or RSG_2 ;
 X_{10} is hydrocarbon, heterosubstituted
 35 hydrocarbon, heteroaryl, heterosubstituted heteroaryl,
 RSG_1 or RSG_2 ;
 Z_2 , Z_4 , Z_9 and Z_{10} are independently hydrocarbon,
 heterosubstituted hydrocarbon, heteroaryl, or
 heterosubstituted heteroaryl;
 40 RSG_1 is an electron-affinic moiety;
 RSG_2 is $-L-(RSG_1)_n$;
 L is a linker comprising a chain of 1 to 30
 atoms in the chain, the atoms being selected from the
 group consisting of C, O, N, S, Si, and P; and
 45 n is an integer greater than or equal to 1.

14. A compound corresponding to the structure:



wherein

- M comprises ammonium or is a metal;
 5 R_1 is hydrogen or hydroxy;
 R_2 is $-OT_2$, $-OCOZ_2$, $-OCOOZ_2$, RSG_1 or RSG_2 ;

R_4 is $-OT_4$, $-OCOZ_4$, $-OCOOZ_4$, RSG_1 or RSG_2 ;

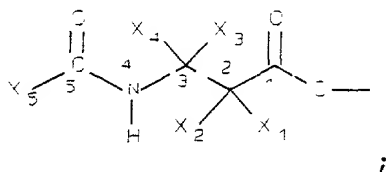
R_7 is hydrogen, keto, $-OT_7$, $-OCOZ_7$, $-OCOOZ_7$, RSG_1 or RSG_2 ;

10 R_9 is RSG_1 or RSG_2 ;

R_{10} is hydrogen, keto, $-OT_{10}$, $-OCOZ_{10}$, $-OCOOZ_{10}$, RSG_1 or RSG_2 ;

R_7 , R_9 , and R_{10} independently have the alpha or beta stereochemical configuration;

15 R_{13} is hydroxy, protected hydroxy, keto, MO- or



R_{14} is hydrogen, hydroxy, protected hydroxy, RSG_1 or RSG_2 ;

20 T_2 , T_4 , T_7 and T_{10} are independently hydrogen or hydroxy protecting group;

X_1 is $-OX_5$;

X_2 is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

25 X_3 and X_4 are independently hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, heterosubstituted heteroaryl or RSG_1 ;

X_5 is $-X_{10}$, $-OX_{10}$, $-SX_{10}$, or $-NX_8X_{10}$;

30 X_6 is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, heterosubstituted heteroaryl, hydroxy protecting group or a functional group which increases the water solubility of the taxane derivative;

X_8 is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, RSG_1 or RSG_2 ;

35 X_{10} is hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, heterosubstituted heteroaryl, RSG_1 or RSG_2 ;

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Z_2 , Z_4 , Z_7 , and Z_{10} are independently hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

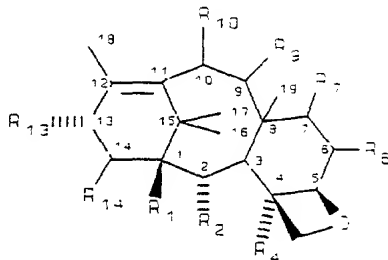
40 RSG_1 is an electron-affinic moiety;

RSG_2 is $-L-(RSG_1)_n$;

L is a linker comprising a chain of 1 to 30 atoms in the chain, the atoms being selected from the group consisting of C, O, N, S, Si, and P; and

45 n is an integer greater than or equal to 1.

15. A compound corresponding to the structure:



wherein

M comprises ammonium or is a metal;

5 R_1 is hydrogen or hydroxy;

R_2 is $-OT_2$, $-OC(=O)Z_2$, $-OC(=O)OZ_2$, RSG_1 or RSG_2 ;

R_4 is $-OT_4$, $-OC(=O)Z_4$, $-OC(=O)OZ_4$, RSG_1 or RSG_2 ;

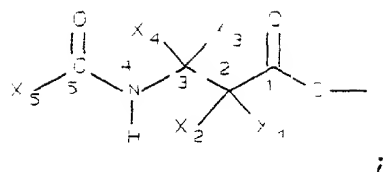
R_7 is hydrogen, keto, $-OT_7$, $-OC(=O)Z_7$, $-OC(=O)OZ_7$, RSG_1 or RSG_2 ;

10 R_9 is hydrogen, keto, $-OT_9$, $-OC(=O)Z_9$, $-OC(=O)OZ_9$, RSG_1 or RSG_2 ;

R_{10} is RSG_1 or RSG_2 ;

R_7 , R_9 , and R_{10} independently have the alpha or beta stereochemical configuration;

15 R_{13} is hydroxy, protected hydroxy, keto, $MO-$ or



R_{14} is hydrogen, hydroxy, protected hydroxy, RSG₁ or RSG₂;

T_2 , T_4 , T_7 and T_9 are independently hydrogen or hydroxy protecting group;

X_1 is $-OX_6$;

X_2 is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

X_3 and X_4 are independently hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, heterosubstituted heteroaryl or RSG₁;

X_5 is $-X_{10}$, $-OX_{10}$, $-SX_{10}$, or $-NX_3X_{10}$;

X_6 is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, heterosubstituted heteroaryl, hydroxy protecting group or a functional group which increases the water solubility of the taxane derivative;

X_9 is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, RSG₁ or RSG₂;

X_{10} is hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, heterosubstituted heteroaryl, RSG₁ or RSG₂;

Z_2 , Z_4 , Z_7 and Z_9 are independently hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

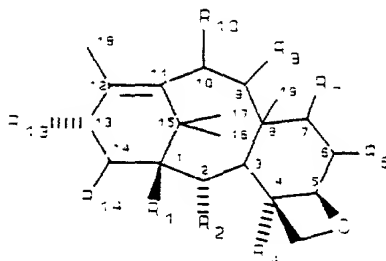
RSG₁ is an electron-affinic moiety;

RSG₂ is $-L-(RSG_1)_n$;

L is a linker comprising a chain of 1 to 30 atoms in the chain, the atoms being selected from the group consisting of C, O, N, S, Si, and P; and

n is an integer greater than or equal to 1.

16. A compound corresponding to the structure:



wherein

M comprises ammonium or is a metal;

R₁ is hydrogen or hydroxy;

R₂ is -OT₂, -OCOZ₂, -OCOOZ₂, RSG₁ or RSG₂;

R₄ is -OT₄, -OCOZ₄, -OCOOZ₄, RSG₁ or RSG₂;

R₇ is hydrogen, keto, -OT₇, -OCOZ₇, -OCOOZ₇, RSG₁

or RSG₂;

R₉ is hydrogen, keto, -OT₉, -OCOZ₉, -OCOOZ₉, RSG₁

or RSG₂;

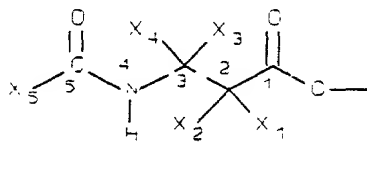
R₁₀ is hydrogen, keto, -OT₁₀, -OCOZ₁₀, -OCOOZ₁₀,

RSG₁ or RSG₂;

R₇, R₉, and R₁₀ independently have the alpha or

beta stereochemical configuration;

R₁₃ is hydroxy, protected hydroxy, keto, MO- or



R₁₄ is RSG₁ or RSG₂;

T₂, T₄, T₇, T₉, and T₁₀ are independently hydrogen

or hydroxy protecting group;

X₁ is -OX₆;

X₂ is hydrogen, hydrocarbon, heterosubstituted hydrocarbon, heteroaryl, or heterosubstituted heteroaryl;

- 25 X_3 and X_4 are independently hydrogen,
hydrocarbon, heterosubstituted hydrocarbon, heteroaryl,
heterosubstituted heteroaryl or RSG_1 ;
 X_5 is $-X_{10}$, $-OX_{10}$, $-SX_{10}$, or $-NX_8X_{10}$;
 X_6 is hydrogen, hydrocarbon, heterosubstituted
hydrocarbon, heteroaryl, heterosubstituted heteroaryl,
30 hydroxy protecting group or a functional group which
increases the water solubility of the taxane derivative;
 X_8 is hydrogen, hydrocarbon, heterosubstituted
hydrocarbon, RSG_1 or RSG_2 ;
 X_{10} is hydrocarbon, heterosubstituted
35 hydrocarbon, heteroaryl, heterosubstituted heteroaryl,
 RSG_1 or RSG_2 ;
 Z_2 , Z_4 , Z_7 , Z_9 and Z_{10} are independently
hydrocarbon, heterosubstituted hydrocarbon, heteroaryl or
heterosubstituted heteroaryl;
40 RSG_1 is an electron-affinic moiety;
 RSG_2 is $-L-(RSG_1)_n$;
 L is a linker comprising a chain of 1 to 30
atoms in the chain, the atoms being selected from the
group consisting of C, O, N, S, Si, and P; and
45 n is an integer greater than or equal to 1.

17. A method of killing tumor cells in a warm-blooded animal, the method comprising:

- 5 (a) administering to the warm-blooded animal a taxane containing an electron-affinic radiosensitizing functional group,

(b) followed by, after a time interval sufficient to enhance radiosensitization of the tumor cells, irradiating the tumor cells with a dose of radiation effective to kill the tumor cells.

18. A method as set forth in claim 16 further comprising heat treating the tumor cells.

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